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REPORT

CD NO.

COUNTRY	USSR	DATE OF INFORMATION	1951
SUBJECT	Economic - Coal, mining, machinery	DATE DIST.	26 Apr 1951
HOW PUBLISHED	Monthly periodical		
WHERE PUBLISHED	Moscow	NO. OF PAGES	4
DATE PUBLISHED	Jan and Feb 1951	SUPPLEMENT TO REPORT NO.	
LANGUAGE	Russian		

THIS IS UNEVALUATED INFORMATION

SOURCE Ugol', No 1 and 2, 1951.

IMPROVED MINING METHODS DECREASE KUZBASS COAL LOSSES

HORIZONTAL-LAYER METHOD COMBINED WITH BACKFILLING

I. I. Baleloe,
Ugol', No 2, Feb 1951

Coal losses during actual mining operations were reduced from 31 percent in 1948 to 19 percent in the third quarter of 1950 in mines of the Kuzbassugol' Combine. Coal losses in the Prokop'yevsk-Kiselevsk area, where, for the most part, thick, steeply dipping seams are mined, were reduced from 34.3 percent to 21.2 percent. These results were achieved by regulating existing systems of mining with caving of the side rock and by introducing systems of mining with backfilling of the worked-out area.

An analysis shows that coal losses decreased as follows in 1950, as compared with 1948, when steeply dipping seams were worked by a method including caving of the side rock: using the shield method of mining, from 31.5 percent to 26 percent; using the long-pillar method, from 27.9 percent to 18.3 percent; using the sloping-layer method, from 33.4 percent to 21.8 percent; using the horizontal-layer method, from 32.5 percent to 16.8 percent.

Ninety mine faces in Kuzbass mines are fulfilling the task of backfilling worked-out areas in mining thick, steeply dipping coal seams. The following table classifies these 90 mine faces according to the type of mining employed and the method of backfilling used as of 1 December 1950:

Mining System	Backfilling: Automatic	Hydraulic	Pneumatic	Machine	Total	Percent
Long pillars along strike of seam	18	2	-	-	20	22
Sloping layer	22	7	-	-	29	32

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Mining System	Automatic	Hydraulic	Pneumatic	Backfilling Machine	Total	Percent
Horizontal layer	-	-	11	19	30	33
Strips along rise of seam	1	-	-	-	1	1
Transverse sloping layer	-	4	-	2	6	7
Shields	4	-	-	-	4	5
Total	45	13	11	21	90	100
Percent	50	14	12	24	100	-

From the above data it is clear that the most widespread methods of working thick, steeply dipping seams with backfilling of the worked-out area are the horizontal-layer and the sloping-layer methods which account for 59 mine faces, or 65 percent of the 90 mine faces under discussion. However, the contribution of these two methods to the coal output differs. Although, taken together, they account for 62 percent of the coal output, where backfilling of the worked-out areas is employed, the horizontal-layer method accounts for only 18 percent, while the sloping-layer method accounts for 44 percent.

The following table gives data for the third quarter of 1950 on the productivity of mine faces using different methods of mining and backfilling of the worked-out area:

Mining System	Backfilling Method	Monthly Productivity of Mine Face (tons)
Long pillar	Automatic	2,144
Same	Hydraulic	2,205
Sloping layer	Automatic	1,827
Same	Hydraulic	1,920
Horizontal layer	Backfilling machine	730
Same	Hydraulic	1,188
Same	Pneumatic	684
Transverse sloping layer	Hydraulic	1,559
Same	Backfilling machine	1,349
Shield	Automatic	5,753

The Kuznetsk Scientific Research Coal Institute worked out four different schemes to improve the coal output, using the horizontal-layer method. The first provided for the use of the horizontal-layer method with pneumatic backfilling of the worked-out area, and it could be employed for coal seams of any thickness. According to this method, one month's work with 20 days devoted to coal mining and 10 days to backfilling yielded an output of 3,000 tons of coal at a mine face in a 10-meter seam, and 4,500 tons in a 15-meter seam. A variant of this scheme, also using the horizontal-layer method with pneumatic backfilling, was intended only for seams more than 10 meters thick. The monthly output from a mine face working a 15-meter-thick seam, also devoting 20 days to coal mining and 10 days to backfilling, was, in this case, also 4,500 tons of coal.

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The third scheme provided for the use of backfilling machines in connection with the horizontal-layer method, and was intended for coal seams up to 10 meters thick. A month's work at a mine face in a 10-meter seam, including 15 days of coal mining and 15 days of backfilling, yielded 2,250 tons of coal. The fourth scheme also provided for the use of backfilling machines in connection with the horizontal-layer method, but it was designed for seams more than 10 meters thick. A month's work, consisting of 15 days of coal mining and 15 days of backfilling, yielded 3,400 tons of coal at a mine face in a 15-meter coal seam.

The plans drawn up for increasing the efficiency of the horizontal-layer method also included plans for development work, efficient methods for mechanizing coal extraction, carrying out backfilling, and transport of coal and backfilling materials.

TESTS WITH MZ-1 BACKFILLING MACHINE PROVE EFFECTIVE

A. A. Furman
Ugol', No 1, Jan 1951

The MZ-1 backfilling machine, designed by the Kuznetsk Affiliate of Giprouglemash, belongs to the class of belt-roller machines and has a curved belt. The machine is intended for backfilling the worked-out area in working thick coal seams, for the most part, by the horizontal-layer method.

The machine consists mainly of a welded frame between whose sides are located three rollers: a deflecting roller, a working roller, and a drive roller. There is, in addition, a tension roller which can be adjusted and which is fastened to the tension unit. The machine is put into motion by an electric motor with a single-stage reducing unit. Backfilling material is fed to the machine from a bunker attached to the top of the frame.

The technical characteristics of the machine are as follows:

Productivity of machine	65 cu m/hr
Hurling distance	8-10 m
Angle of inclination of belt from horizontal	5-30 deg
Velocity of belt	15 m/sec
Drive motor	MA 143-1/4 electric motor
Capacity	11.4 kw
RPM	1,460
Dimensions of machine	
Length	1,750 mm
Width	860 mm
Height	950 mm
Weight of machine	825 kg

Two experimental models of the MZ-1 were tested from February through August 1950 in Mine No 3 of the Kaganovichugol' Trust of the Kuzbassugol' Combine. The experiments were carried on in the Moshchnyy seam which is from 17.7 to 19 meters thick. The seam was worked at the 220-meter level by the horizontal-layer method. The length of the cleared-out sector was 154 meters along the strike of the seam, and the height was 80 meters.

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The backfilling material was crushed rock, and a special quarry from which to mine it was opened up. After preliminary blasting, the rock was delivered to a special SM-11 rock-crushing machine. The backfilling material varied in size, as shown in the following table:

Size of Pieces of Rock (mm)	0-1	1-3	3-6	6-13	13-25	25-50	Above 50	Total
Percentage	24.5	6.2	12.1	12.2	17.5	13.4	14.1	100.0

During the experimentation period, 162.8 meters along the strike of the seam were worked; that is, the first layer was completely removed and the second one started. At the same time, 10,962 tons of coal were mined, and 8,060 cubic meters of backfilling were hurled into the worked-out area.

The experimental work indicated that the MZ-1 backfilling machine is entirely suitable for use in working coal deposits by the horizontal-layer method. The machine is simple and its only requirements for the backfilling materials are that they must consist of homogenous materials, and that the pieces must not be larger than 80-100 millimeters. The belts of the machine were not found to be very durable and a special, new type of belt, capable of transporting a minimum of 2,500-3,000 cubic meters of backfilling materials before wearing out, should be designed.

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